the I.P. Sharp newsletter

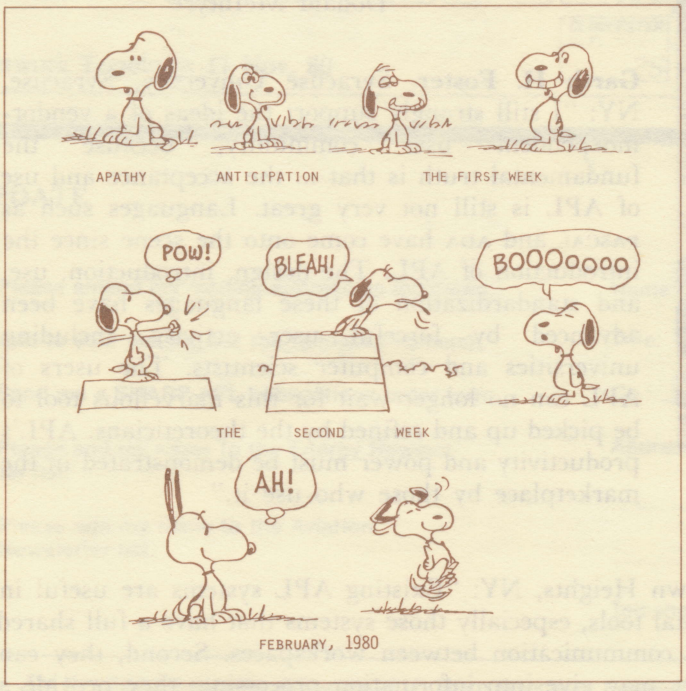
November/December 1980
Volume 8/Number 6

APL:

THE LINGUA FRANCA OF THE EIGHTIES?

APL is spoken in many countries, and 600 users from thirteen of them (Canada, the United States, Mexico, Spain, England, Switzerland, Brazil, Denmark, Italy, Germany, Sweden, The Netherlands, and France) gathered in Toronto in October for the second international APL Users Meeting. Representatives from I.P. Sharp's 47 offices were also in the city to attend and participate in the conference.

The APL Users Meeting is primarily a forum for users, to present real world problems and triumphs, to exchange ideas on applications, to learn about APL language developments, and to discuss ways of improving their programming skills and teaching methods. Fifty papers presented during daytime sessions and ten papers from the evening technical seminars are now available in the published proceedings. The book, 648 pages and $18 per copy, is available through any I.P. Sharp office.



In-house APL was illustrated by Phyllis Kent and Dana Cartwright, Syracuse University, in their talk "SHARP APL Syracuse," – with the help of Charles M. Schulz ("My Anxieties Have Anxieties," Holt Reinhart Winston)

The next Users Meeting will be held in Toronto in October of 1982. We hope to see you there!

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Loud and clear, throughout the conference, two themes emerged:

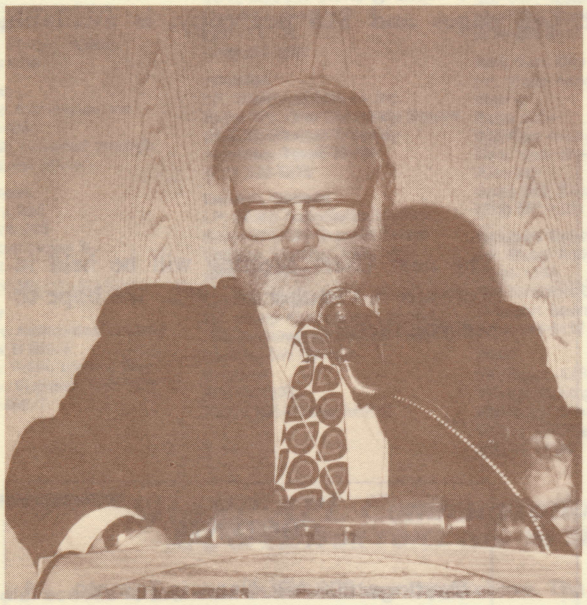
- "We love APL, it's the best thing that's happened to our shop." (..."If it's so good, why is it not more readily accepted?")

- "Let's make it even more effective. Give us programming tools and programming standards; give us teaching tools: a means of turning out well-trained APL'ers; give us systems with user-friendly frontends!"

Quotes:

Donald B. McIntyre, Pomona College, Claremont, Ca, who has persuaded a liberal arts college, faculty and staff alike, to use APL before all other computer languages (commenting on the concept of the 'empty vector'): "I think we have the Arabs to thank for inventing zero, but I know that we have Dr. Iverson to thank for inventing nothing."

Donald McIntyre



Garth Foster at the podium

Garth H. Foster, Syracuse University, Syracuse, NY: "I still strongly support the ideas of a vendor-independent user community, because the fundamental truth is that ... the acceptance and use of APL is still not very great. Languages such as PASCAL and ADA have come onto the scene since the introduction of APL. The design, introduction, use, and standardization of these languages have been advanced by forceful user activity, including universities and computer scientists. The users of APL can no longer wait for this marvellous tool to be picked up and refined by the theoreticians. APL's productivity and power must be demonstrated in the marketplace by those who use it."

Adin Falkoff, IBM Research Center, Yorktown Heights, NY: "Existing APL systems are useful in two ways. They are, first, powerful experimental tools, especially those systems that have a full shared variable facility which provides asynchronous communication between workspaces. Second, they can themselves be objects of study for insights they may give into information processing; they provide a model with essential properties, complete, but relatively uncluttered as compared to conventional systems."

Maurice Elliot, Dome Petroleum Limited, Calgary, Alta: "What can we do to protect ourselves from the problems of APL while we take advantage of its tremendous power? Apart from badgering the implementors for changes, I believe we can do a lot by taking the trouble to build and use libraries of software tools to help us produce and maintain systems."

Robert C. Metzger, I.P.Sharp Associates, Rochester, NY: "APL programmers must seek ever better software tools to bring about productivity increases." Bob's practical approach to programming in APL was enthusiastically received.

Dr. Kenneth E. Iverson, I.P.Sharp Associates, Toronto, Ont, discussed the inductive method of introducing APL. He drew a parallel between teaching spoken languages and teaching APL: "A class in the purely inductive mode is conducted entirely in the target language, with no use of the student's mother tongue. Expressions are first learned by imitation, and concepts are imparted by such devices as pointing, pictures, and pantomime; students answer questions, learn to ask questions, and experiment with their own statements, all with constant and immediate reaction from the teacher in the form of correction, drill, and praise, expressed, of course, in the target language."

Roy Sykes, Jon McGrew, and **Robert Metzger**, each representing a different vendor, generated tremendous enthusiasm (and answered many questions) in a session on APL techniques and programming tools. The last afternoon session drew almost 400 people when **Don McIntyre, Gillian Wade, E.M. Edwards**, and **Ken Iverson**, spoke about teaching APL.

Dr. K.E. Iverson

Adin Falkoff

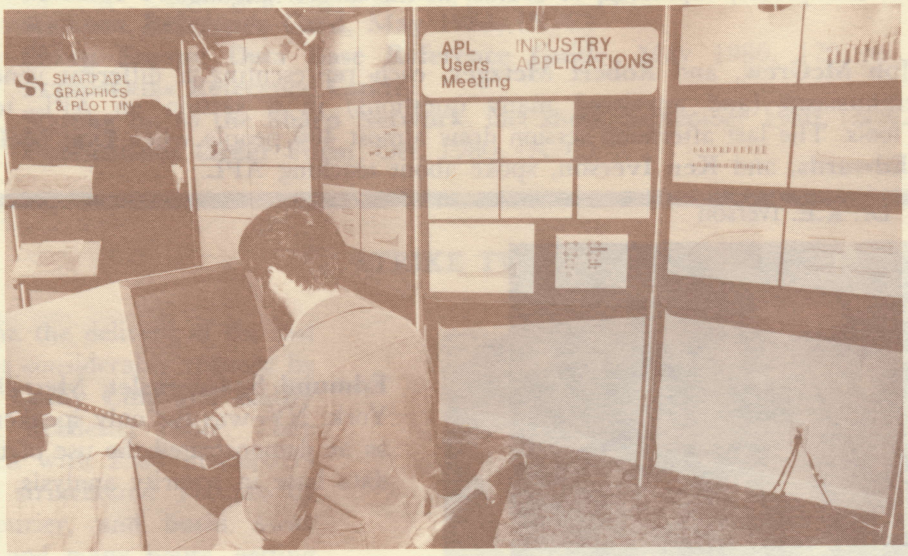
Edmund S. Greenslet, Merrill Lynch, New York, NY, was the only speaker to go on-line as he demonstrated the use of the CAB airline data base in security analysis.

Ed Greenslet

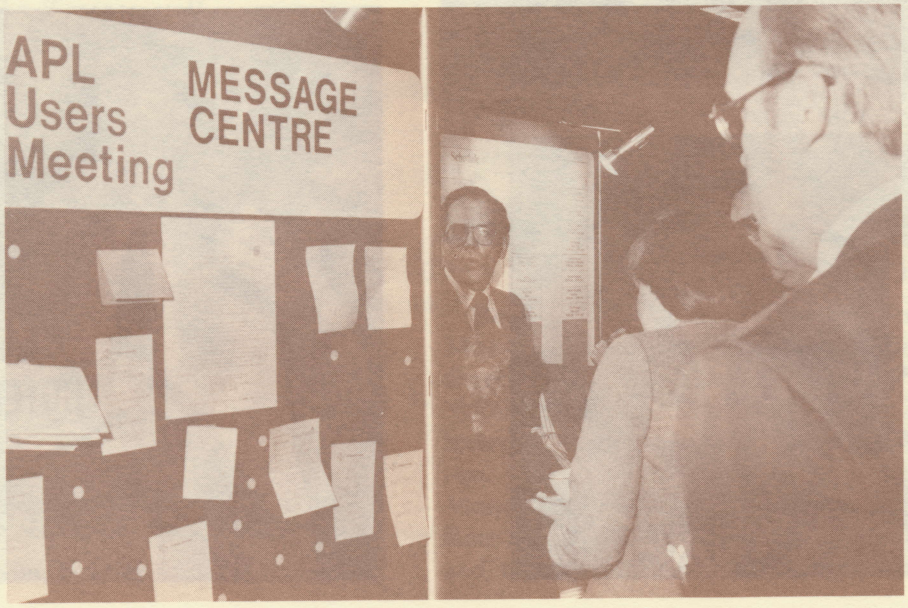
Curtiss C. Grove, Legi-Slate, Dallas, Texas, does not consider himself an APL user: "In the sense that I assume I.P. Sharp intends its customers to be users of APL, I do not qualify. I don't know a quad from a catenate, and I frankly don't care about these things." His system, LEGI-SLATE is a bill and vote tracking service, and he made a case for protecting the user from "computerese": "But I would be remiss if I didn't comment about those occasional announcements such as *LINES DOWN* or *APL DEFINITELY HUNG* or, my favourite of all, *AWAITING FUNCTION FOUR*. In the handbook we provide for our users, we quote these mysterious terms they may see from time to time, and then explain that all they really mean is 'Something broke. Go have a cup of coffee and try again in a few minutes'."

The whole top floor of the hotel became the 'hospitality suite', complete with terminals, a publications display, graphics display, and a billiard table.

Display of Graphics and Plotting
Applications in Industry, in the hospitality suite.



Crossroads: APL Message Centre



REUNION d'UTILISATEURS FRANCAIS SHARP APL

Paris, le 11 Septembre 1980

A meeting with a view

The first French APL users meeting organised by the Paris office of I.P. Sharp drew approximately 20 users. The intention was to provide a forum for French customers to exchange ideas on their APL work and to demonstrate new and existing Sharp software in an informal atmosphere. Customers spoke of their own APL systems and I.P. Sharp staff of various programming aids, packages and data bases. Lunch and refreshments taken on the rooftop terrace overlooking the Eiffel tower helped the general 'bonhomie'. The success of this first meeting will ensure that these become regular events for our Paris office.

FIRST APL USERS LUNCHEON

Chuck Meyer, Rochester

Our first APL Users Luncheon, recently held in Rochester, was a great success. Over forty APL enthusiasts from the Rochester-Syracuse area came to hear the guest speaker, Dr. Ken Iverson, discuss character sorting in APL. Many thanks to Ken for his time and participation which helped to make this meeting a success.

The general consensus was to hold this kind of user meeting on a regular basis, possibly on such topics of interest as cost reduction, APL education, APL for large data bases, new operators, and using APL with other languages. The success of this meeting is a good indication of the interest and need in the APL community to meet informally to share new ideas and concepts. We all look forward to our next meeting.

1980 Users Luncheon Schedule
Rochester, NY

Oct. 15	**Structure and Style in APL**, Guest Speaker, Dr. Paul Berry
Nov. 13	**Learning From Your APL Mistakes**, Panel Discussion
Dec. 9	**Practical Applications of Direct Definition**, Guest Speaker, Robert C. Metzger

ECONOMIST'S STATISTICS

William Merrit, Economist
James R. LymBurner & Sons Limited, Toronto

The **Economist's Statistics** is an economic information service which is available from JRLS Limited on the SHARP APL system. We offer both the casual and serious user of economic and market statistics a complete source of up to date, consistent, timely, accurate, and easily accessible data which can be readily manipulated and graphed. The ES data bank is divided into three parts: Daily, Historical and Gross National Product statistics, and we offer measurement and graphics software packages to analyze and present the data.

The **Daily Statistics** contains current and historical data for a variety of series, all provided on a daily basis:

- International Currencies
- International Interest Rates
  - 3-Month Rates
  - Domestic Government Long Term Bond Yields
  - Interest Rate series by country for the U.K., Canada, Europe and the U.S.
- International Stock Market Major Indices and Sub-indices
  - London
  - New York
  - Toronto
  - Tokyo
- Commodity Indices
  - Reuters and DJ
  - Economist
- Food Commodity Prices
- Metal Commodity Prices
- Gold Coins
- World Shipping Statistics (single voyage and world scale)

Future or forward prices for London, New York and Chicago are available. Monthly series earlier than 1970 can be located in the **Historical Statistics** section, but are not on-line.

The **Gross National Product Statistics** portion of the data includes current and historical income and expenditure data for five countries: Canada, Germany, Japan, the United Kingdom, and the United States. The data for each country is divided into five tables which are further broken down into series along sector lines, so that the data may be analyzed and compared by series or on an aggregate basis. The definitions of the series have been made as consistent as possible to facilitate country to country comparisons. Three packages are provided to enhance the usefulness of these statistics: one for analysis, one for business cycle forecasting, and a graphics package for visual comparison of various series.

The data is **seasonally adjusted at annual rates** and is supplied on a quarterly basis with annual averages. The series are updated each quarter and revisions are made as soon as they become available from the individual countries supplying the data.

For a more complete description of the services offered by James R. LymBurner & Sons Limited, consult the **Economics Statistics Manual** which may be obtained by writing to 20 Victoria Street, Toronto, Canada, or calling (416) 862-0595.

U.S. ECONOMIC DATA

The DRI Capsule Data Bank

Mike Johnson, Toronto

The DRI Capsule Data Bank is now available to all users of the Sharp system. It contains time series information relating to the U.S. economy, including the national income and product accounts, population, employment and earnings data, financial and non-financial statistics, and the 'Business Conditions Digest' series. The data base contains 3800 monthly, quarterly, and yearly time series, and is updated on a monthly basis with data received from Data Resources Inc. (DRI). Access to this data base is available on the Sharp system via 39 *MAGIC* using the access command *DRICAP*, which has the following syntax:

DRICAP **'series code(s)'**

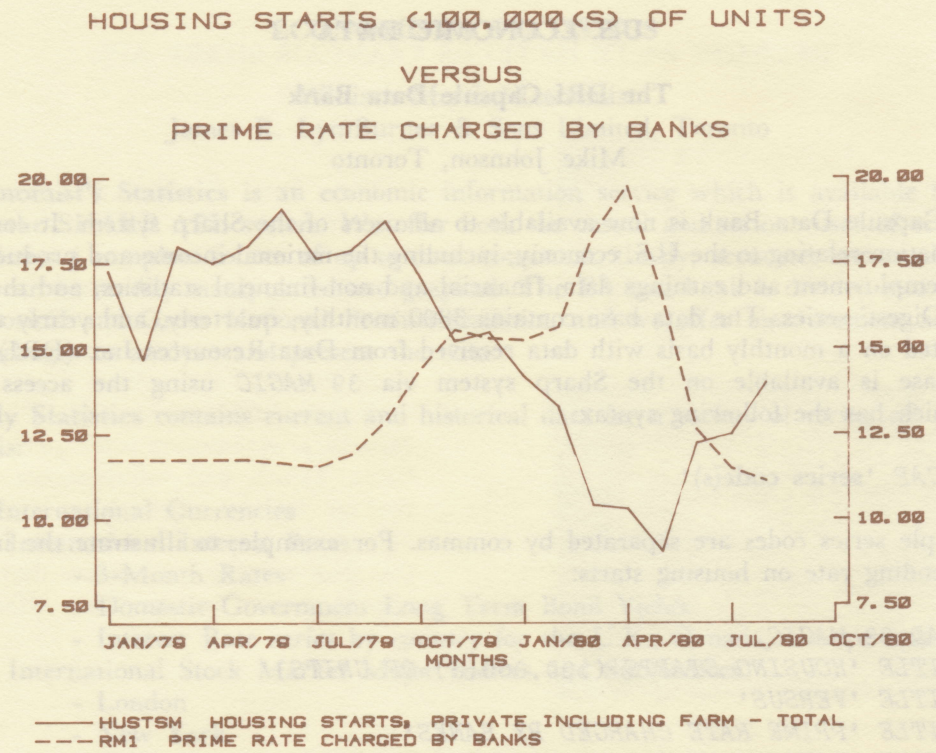
where multiple series codes are separated by commas. For example, to illustrate the influence of the prime lending rate on housing starts:

```
)LOAD 39 MAGIC
1 TITLE 'HOUSING STARTS (100,000(S) OF UNITS)'
3 TITLE 'VERSUS'
5 TITLE 'PRIME RATE CHARGED BY BANKS'
MONTHLY, DATED 1 79
AUTOLABEL ◇ LABELWIDTH 60
PUT DRICAP 'HUSTSM,RM1'
1 PUT 10 TIMES ITEM 1
ΔSUPERPLOT 'TERMINAL,HP/FONT,TITLE,1.5/STYLE,SOLID,SDASH'
'LRB' PLOT ABOVE
```

See plot overleaf

A directory for the DRI Capsule Data Bank is produced by DRI and is available from I.P. Sharp Associates upon request. It is also possible to obtain a highspeed listing of the series codes currently available in the data base by entering: *DRICAP 'DIRECTORY'*. The two directories are organized differently, with the published version being preferable. However, the highspeed listing has the advantage that it always contains the most recent set of series codes.

United States economic data originally supplied by the National Bureau for Economic Research (NBER) has been available on the Sharp system for some time now. However, since that data is contained within the DRI Capsule Data Bank, there is little need to support both data bases. The on-line NBER data received its last monthly update in September and will remain in its present state until the end of this year. At that time it will be removed from the system. The DRI Capsule Data Bank should prove to be more than a satisfactory replacement for the NBER data base, and access via MAGIC remains substantially the same.



OAG NEWS

Alan Gelman, Toronto

Customized OAG Reports

Users of the **Official Airline Guide** data base can now produce individually tailored reports from retrieved data by using the new function *SHOW* in workspace 702 *OAG*. Raw OAG datais very useful for information analysis, but it is not in the most convenient form for simply browsing. With the help of *SHOW* it is now easy to generate formatted reports. Special features are available, such as the ability to set the page size, titles, and a sorting sequence for the various fields.

The report below describes all of the scheduled passenger airline flights between London's Heathrow airport and JFK in New York. Users familiar with MAGIC will recognize many of the report generating commands:

```
      )LOAD 702 OAG
SAVED 21.27.55 08/26/80

      CLEAR
      DAILY, DATED AT 13 9 80
      TITLE 'FLIGHTS FROM LONDON-HEATHROW TO NEW YORK''S JFK AIRPORT'
      TITLE 'DEPARTING ON SEPTEMBER 13 1980'
      PAGEWIDTH 110
      PAGEDEPTH 60
      A RETRIEVE AND STORE THE DATA
      OAGOPTIONS 'PASSENGER,NOCARGO,NOMOVES,NUMERIC'
      PUT 9 8 3 4 5 10 12 XOAG (1 EQL 'LHR'), 2 EQL 'JFK'
      A DISPLAY THE DATA SORTED BY ARRIVAL TIME
      9 SHOW ABOVE
```

```
**    FLIGHTS FROM LONDON-HEATHROW TO NEW YORK'S JFK AIRPORT
                DEPARTING ON SEPTEMBER 13TH 1980

                DEPAR-                          EQUIP-    TOTAL
    ARRIVAL     TURE        CARRIER FLIGHT      MENT      TRAVEL    SERVICE
    TIME        TIME        CODE    NUMBER      TYPE      TIME      CLASSES
=============================================================================
 1.  829         930        BA        173       SSC       239       R
 2. 1014        1115        BA        171       SSC       239       R
 3. 1335        1100        PA        101       747       455       CFY2
 4. 1335        1100        BA        175       747       455       CFM2
 5. 1435        1200        TW        703       747       455       CFY2
 6. 1535        1300        PA          1       747       455       CFY2
 7. 1535        1300        AI        111       747       455       FSY2
 8. 1735        1500        BA        177       747       455       CFM2
 9. 1905        1630        PA        103       747       455       CFY2
10. 1915        1640        TW        701       L10       455       CFY2
11. 2105        1815        BA        179       707       470       CFM

OAG DATA COPYRIGHT OAG, INC. ILLINOIS, 1978,1979,1980
**
```

The display system also features automatic wraparound if the report is wider than the specified *PAGEWIDTH*, and a *REORDER* command to rearrange stored data. The default column labels can be changed by the command *COLLABEL*.

Full documentation for *SHOW* (approximately two pages of terminal output) can be obtained by typing *OAGNEWS* in workspace 702 *OAG* and then asking for news item 1. Information on the Official Airline Guide data base can be found in the **OAG Data Base Reference Guide** available from your local I.P. Sharp representative.

OAG Data Base Now Available Without Surcharge!

OAG users have, until now, paid a surcharge of 10 cents (U.S.) per CPU unit for access to the OAG data base. We are pleased to announce that, effective October 1, 1980, the surcharge is no longer in effect. We expect that this change will encourage users to examine new applications for this data, and to experiment with its use.

COURSE SCHEDULES: PLEASE NOTE!

All I.P. Sharp branch offices and international offices offer a selection of courses in APL: the APL language is taught at different levels; one or two-day seminars on system features or on new applications; courses to upgrade programming skills; and many more.

We will no longer publish a schedule of courses in the newsletter, since this information is available locally. Very often, too, courses are scheduled in response to user requests. Please call your local I.P. Sharp office for information about the schedule in your area.

PUBLICATIONS

The Sharp Publications Group has been busy over the summer producing a variety of new and revised publications. A new Order Form is also available from your local office. All the manuals, textbooks, brochures, fact sheets, and reference cards are listed. Please make sure that you have up to date documentation handy.

New:

- **1980 APL Users Meeting: Proceedings**, Oct. 1980, 648 pp, $18
- **Additions and Corrections to the SHARP APL Reference Manual** (First Edition, Mar. 1979), July 1980, 23pp, (N/C)
- **TEXTEDIT Users' Manual**, July 1980, 57 pp, $6
- **DRI Capsule Data Bank Directory**, June 1980, 172 pp, $5

Revised:

- **MAGIC Users Manual**, May 1980, 141 pp, $8, (replaces MAGIC for Time Series Analysis)
- **Message Processing Facility**, May 1980, 86 pp, $6
- **MAILBOX Reference Card**, May 1980, (N/C)
- **Sharp Energy Data Base Reference Guide**, May 1980, 129 pp, $7, (replaces **PETROSERIES Reference Guide**)
- **Signing on to the Sharp Network**, fact sheet, September 1980, (N/C)
- **Publications Order Form**, Oct. 1980, (N/C)

STRIKE TWO!

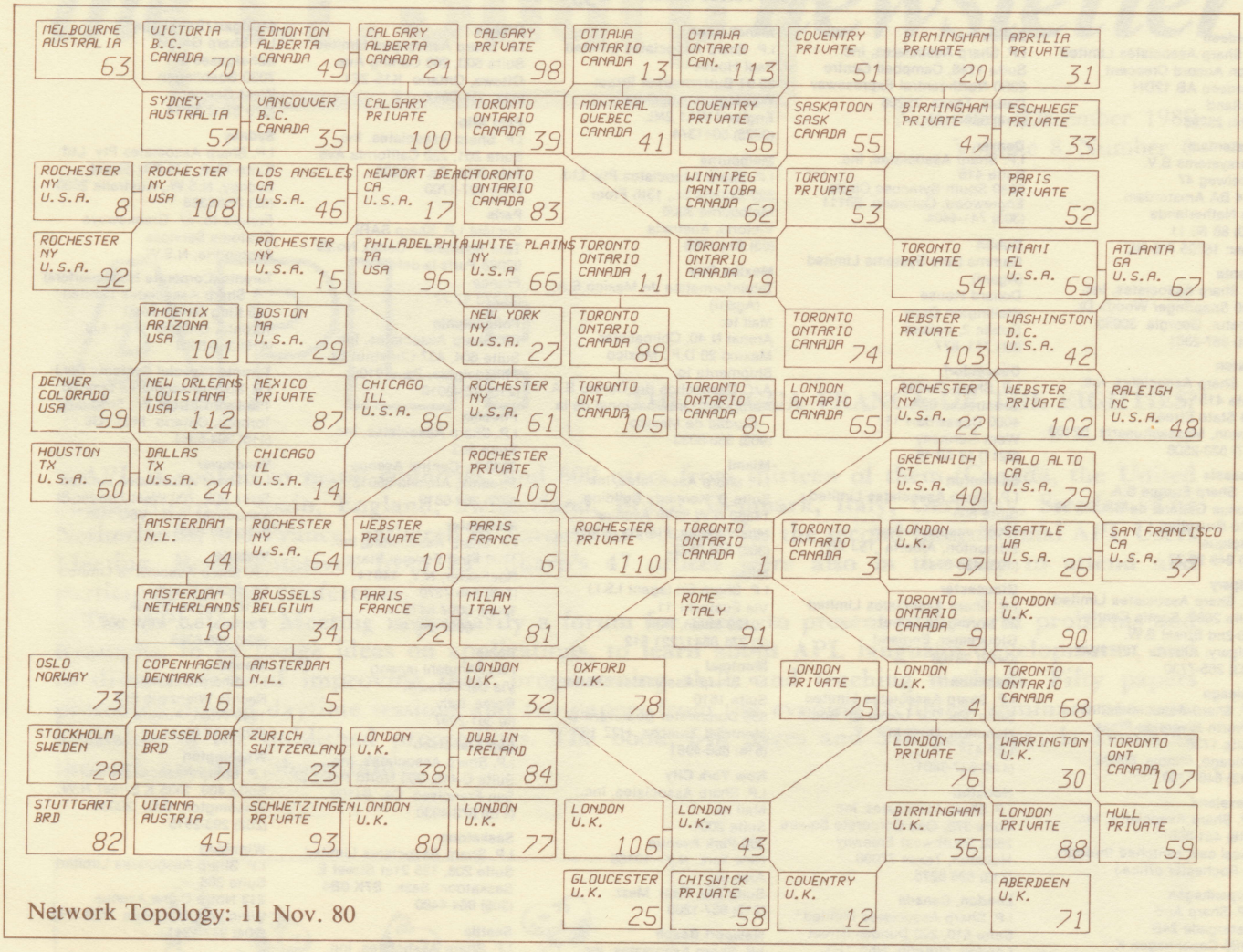
Any delay in the delivery of the last newsletter was considerably reduced by the efforts of **Cathy Ling** and **Kathy Brule** of the Rochester office. They were presented with 2500 newsletters shipped from strikebound Toronto by late night courier, and burnt away midnight oil, and many hours, getting the envelopes into the mail. Many thanks from the Toronto staff.

Ron Bradley

Cathy and Kathy

LONDON ONTARIO

Ron Bradley has been appointed the new Branch Manager in our London office. Ron has a B.Sc. degree in Computer Science from the University of Toronto, where he first encountered APL. He joined Sharp Toronto Sales and Support over three years ago, and most recently was a Support Group Manager responsible for the banking community. Ron also worked on financial planning, modelling, and management information systems.



Network Topology: 11 Nov. 80

UPDATE

Label number: _____

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Jeanne Gershater, *Editor*
Ginger Kahn, *Assistant Editor*
Ginger Kahn, *Circulation*

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I.P. Sharp Associates **Head Office:** 145 King Street West, Toronto, Canada M5H 1J8 (416) 364-5361

International Offices

Aberdeen
I.P. Sharp Associates Limited
5 Bon Accord Crescent
Aberdeen AB 12DH
Scotland
(0224) 25298

Amsterdam
Intersystems B.V.
Kabelweg 47
1014 BA Amsterdam
The Netherlands
(020) 86 80 11
Telex: 18795 ITS NL

Atlanta
I.P. Sharp Associates, Inc.
5000 Snapfinger Woods Dr.
Decatur, Georgia 30035
(404) 987-2301

Boston
I.P. Sharp Associates, Inc.
Suite 415
148 State Street
Boston, Massachusetts 02109
(617) 523-2506

Brussels
I.P. Sharp Europe S.A.
Avenue General de Gaulle, 39
1050 Bruxelles
Belgique
(02) 649 99 77

Calgary
I.P. Sharp Associates Limited
Suite 2660, Scotia Centre
700-2nd Street S.W.
Calgary, Alberta T2P 2W2
(403) 265-7730

Chicago
I.P. Sharp Associates, Inc.
2 North Riverside Plaza
Suite 1736
Chicago, Illinois 60606
(312) 648-1730

Cleveland
I.P. Sharp Associates, Inc.
(216) 431-6861
(local call, switched through
to Rochester office.)

Copenhagen
I.P. Sharp ApS
Østergade 24B
1100 Copenhagen K
Denmark
(01) 11 24 34

Coventry
I.P. Sharp Associates Limited
7th Floor B Block
Coventry Point, Market Way
Coventry, England CV1 1EA
(0203) 21486/7

Dallas
I.P. Sharp Associates, Inc.
Suite 1148, Campbell Centre
8350 Northcentral Expressway
Dallas, Texas 75206
(214) 369-1131

Denver
I.P. Sharp Associates, Inc.
Suite 416
5680 South Syracuse Circle
Englewood, Colorado 80111
(303) 741-4404

Dublin
Gamma Data Systems Limited
(Agent)
Dollard House
Wellington Quay
Dublin 2, Ireland
(01) 711 877

Düsseldorf
I.P. Sharp GmbH
Leostrasse 62A
4000 Düsseldorf 11
West Germany
(0211) 57 50 16

Edmonton
I.P. Sharp Associates Limited
Suite 505
10065 Jasper Avenue
Edmonton, Alberta T5J 3B1
(403) 428-6744

Gloucester
I.P. Sharp Associates Limited
29 Northgate Street
Gloucester, England
(0452) 28106

Hamilton
I.P. Sharp Associates Limited
Suite 308, 237 Locke St. South
Hamilton, Ontario
L8P 4T4
(416) 527-3801

Houston
I.P. Sharp Associates, Inc.
Suite 375, One Corporate Square
2600 Southwest Freeway
Houston, Texas 77098
(713) 526-5275

London, Canada
I.P. Sharp Associates Limited
Suite 510, 220 Dundas Street
London, Ontario N6A 1H3
(519) 434-2426

London, England
I.P. Sharp Associates Limited
132 Buckingham Palace Road
London SW1W 9SA
England
(01) 730-0361
Telex: 8954178SHARP G

Manchester
I.P. Sharp Associates Limited
Paul House
89-91 Buttermarket Street
Warrington, Cheshire
England WA1 2NL
(0925) 50413/4

Melbourne
I.P. Sharp Associates Pty. Ltd.
520 Collins St., 13th Floor
Melbourne 3000
Victoria, Australia
(03) 614-1766

Mexico City
Teleinformatica de Mexico S.A.
(Agent)
Mail to:
Arenal N 40, Chimalistac
Mexico 20 D.F., Mexico
Shipments to:
A/C Despachos del Centro S.A.
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Miami
I.P. Sharp Associates, Inc.
Suite D, Kennedy Building
14560 N.W. 60th Avenue
Miami Lakes, Florida 33014
(305) 556-0577

Milan
I.P. Sharp Srl (agent I.S.I.)
Via Eustachi 11
20129 Milan, Italy
(2) 271 6541/221 612

Montreal
I.P. Sharp Associates Limited
Suite 1610
555 Dorchester Boulevard W.
Montreal, Quebec H2Z 1B1
(514) 866-4981

New York City
I.P. Sharp Associates, Inc.
Mail to:
Suite 2004
200 Park Avenue
New York, N.Y. 10166
Also at:
Suite 242, East. Mezz.
(212) 557-1200

Newport Beach
I.P. Sharp Associates, Inc.
Suite 1135
610 Newport Center Drive
Newport Beach, Ca. 92660
(714) 644-5112

Oslo
I.P. Sharp A/S
Dronningens gate 34
Mail to: P.Boks 486 Sentrum
OSLO 1, Norway
(02) 41 17 04

Ottawa
I.P. Sharp Associates Limited
Suite 600, 265 Carling Ave.
Ottawa, Ontario K1S 2E1
(613) 236-9942

Palo Alto
I.P. Sharp Associates, Inc.
Suite 201, 220 California Ave.
Palo Alto, Ca. 94306
(415) 327-1700

Paris
Société I.P. Sharp SARL
Tour Neptune - Cedex No.20
92086 Paris-la-defense
France
(1) 773 57 77

Philadelphia
I.P. Sharp Associates, Inc.
Suite 604, 437 Chestnut St.
Philadelphia, Pa. 19106
(215) 925-8010

Phoenix
I.P. Sharp Associates, Inc.
Suite 503
3033 N. Central Avenue
Phoenix, Arizona 85012
(602) 264-6819

Rochester
I.P. Sharp Associates, Inc.
1200 First Federal Plaza
Rochester, N.Y. 14614
(716) 546-7270
Telex: 0097 8473
0097 8474

Rome
I.S.I./Amdahl (agent)
Via del Corso 4,
Rome, Italy
(6) 361-2997

San Francisco
I.P. Sharp Associates, Inc.
Suite C-415, 900 North Point St.
San Francisco, Ca. 94109
(415) 673-4930

Saskatoon
I.P. Sharp Associates Limited
Suite 208, 135 21st Street E.
Saskatoon, Sask. S7K 0B4
(306) 664-4480

Seattle
I.P. Sharp Associates, Inc.
Suite 217,
Executive Plaza East
12835 Bellevue-Redmond Rd.
Bellevue, Washington 98005
(206) 453-1661

Stockholm
I.P. Sharp AB
Kungsgatan 65
S111 22 Stockholm, Sweden
(08) 21 10 19

Stuttgart/Boeblingen
I.P. Sharp GmbH
Schafgasse 3
7030 Boeblingen
West Germany
(070 31) 2 30 14

Sydney
I.P. Sharp Associates Pty. Ltd.
Suite 1342, 175 Pitt Street
Sydney, N.S.W., Australia 2000
(02) 232-6366
Freight to: c/- Greenaways
Customs Services
Alexandria, N.S.W.

Toronto (Corporate Headquarters)
I.P. Sharp Associates Limited
145 King Street West
Toronto, Ontario M5H 1J8
(416) 364-5361

Toronto (Special Systems Div.)
I.P. Sharp Associates Limited
156 Front Street W., 5th Floor
Toronto, Ontario M5J 1G6
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Suite 902, 700 West Pender St.
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(604) 687-8991

Victoria
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Chancery Court
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(604) 388-6365

Vienna
I.P. Sharp Ges.mbH
Rechte Wienzeile 5/3
1040 Wien, Austria
(0222) 57 65 71

Washington
I.P. Sharp Associates, Inc.
Suite 400, 1835 K Street N.W.
Washington, D.C. 20006
(202) 293-2915

Winnipeg
I.P. Sharp Associates Limited
Suite 208
213 Notre Dame Avenue
Winnipeg, Manitoba R3B 1N3
(204) 947-1241

Zurich
I.P. Sharp A.G.
Fortunagasse 15
8001 Zurich
Switzerland
(01) 211 84 24

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Technical Supplement-29

AN ECLECTIC VIEW OF PROGRAMMING

Peter Airs, London
(ex COBOL/BASIC/ALGOL68/FORTRAN/LISP programmer)

You can always tell what programming language someone has previously used when they write their first APL system. FORTRAN users tend to write monolithic functions using upwards of 200 lines of code, whereas COBOL users use long variable names such as WS77RECORDCOUNTER as well as writing 200 line functions. Adherents of BASIC go to the other extreme and find variable names other than single character ones like A, B, C, ... Z extremely painful. This group is sometimes known as the 'Egyptian School' because their APL code is so dense and compact it resembles undecipherable hieroglyphics. All these types of users find loops fascinating and steer well clear of matrices and even vectors if at all possible. On the other hand, ALGOL programmers like to pepper their functions with IF THEN and ELSE and, like all computer purists, have a mortal fear of the naked branch. (GOTO considered harmful - Dijkstra).

It may only take three days to learn the basics of APL, but it takes a few weeks or months to get the 'feel' of any new computer language. In order to write good APL code it is necessary to 'think APL'. If you 'think COBOL' and 'write APL' then the results are a little bizarre, if not expensive. The process of becoming an expert in APL is best achieved by surrounding yourself with APL experts and absorbing from them all the tricks, gimmicks, techniques and utilities that make that person an 'expert'. After processing a couple of these 'experts', you rise to the hallowed position of an APL maestro yourself, or so the theory goes. There are exceptions, of course. One would expect the 'mind numbing' process of several years of COBOL programming to lengthen the adaptation process.

A problem arises when people have not had the benefit of working amongst APL computer professionals in the early stage of their APL career. Because APL is such a rich and powerful language, there are often many solutions to a given problem, ranging from the very simple to the more baroque and contortionistic. The inexperienced and unguided programmers have a tendency to pick a painfully tortuous solution. However they will probably be able to solve the problem in the end. Being justifiably proud of their solution, the programmers go on to achieve much kudos and a high ranking amongst their colleagues, not to mention the odd meal on expenses /company car /salary rise /promotion /holiday in the Caribbean.

Despite the initial flush of success, the programmers have in the back of their mind the feeling that all their vast effort could be reproduced in 5 minutes by an APL whiz-kid. The fear of being 'unmasked' and exposed as an 'amateur' then causes various forms of irrational behaviour by the programmers who will go to enormous lengths to protect their code from outside inspection. The 'lockit' syndrome is symptomatic of this complaint. Workspaces and functions are *LOCKED* or *SEALED* and unlocked copies of all functions are carried in heavy briefcases securely strapped to the wrist not required for one finger typing. Severe cases of this complaint may even learn the subtle art of typing on a terminal switched to 'full duplex' so that all typed input is suppressed. Exponents of this method often maintain that the logic of their code deteriorates rapidly with exposure to sunlight (the photophobic code syndrome). Others have a shredding machine placed conveniently near the terminal to immediately dispose of any functions that inadvertently find their way into print.

Aware and deeply concerned at the problem, we at the London office have come up with a kind of 'APL flying doctor service', better known as the 'APL SUPPORT GROUP' with Ken Chakawhata as chief medicine man and code-surgeon. Armed with only a Paul Berry's manual, a reference card and a list of course dates, this team hopes to eradicate the problem in a few weeks/years/by Christmas. Inspired by the Samaritans, we also have a telephone HELPLINE to answer the calls of all those in distress and a few APL queries as well. Now, it is possible to phone up, and (in strictest confidence) ask one of those questions about some feature of APL you have always wanted to know, but have been afraid to ask.... such as "how do you use)*COPY* ? or, how does dyadic transpose work?"

There now exists a situation where any user of SHARP APL has a pool of APL expertise to call upon. This, if used, would vastly improve the quality and performance of work performed by those who are new to APL and cut off from immediate help within their own organisation. Looking at it another way, each user is allocated a nominal amount of 'free consultancy' which they may or may not wish to take up every month. If not taken up, then users are depriving themselves of one of the key benefits of using the SHARP APL time-sharing service.

Often, our biggest problem is realising we have a problem and need help. Throughout our education we are taught to be self-sufficient and not to 'cheat' or borrow ideas from others, but it has been found that the most successful programmers (in any computer language) are the ones who relentlessly beg, borrow or steal ideas and incorporate them into their own work. Frequently, the major obstacle in our way is our ego which somehow downgrades everyone else's work and makes ours supreme. However, there is much historical evidence for the 'Eclectic Approach'. After all it was Newton who said "If I have seen far, it is because I have stood on the shoulders of giants", and Shakespeare borrowed and adapted the plots to most of his plays.

CONTEST 11

Phil Chastney, Gloucester

I suppose it was seeing the APL expression `4 4⍴4` that brought on a wave of nostalgia. They say that one's childhood is remembered more vividly as one gets older - but it seems like only yesterday that we used to play games with four fours. (Come to think of it, maybe it **was** only yesterday.) The rules were simple enough - and they still are, for that matter.

Each expression may contain as many primitive functions and operators as desired;
it must contain precisely four 4's;
but no other constants;
and no other variables;
and no user-defined functions.

The object is to construct expressions which evaluate to give as many different natural numbers as possible. My first thought was that APL's richer set of primitives would make the job easier, but I soon came to miss the square-root sign of conventional notation. See how far through the natural numbers you can get, and to start you off, try evaluating:

```
4×4×4-4
(4+4)÷(4+4)
(4÷4)+(4÷4)
4+4×4-4
```

Since several people are likely to get stuck at the same point, let us declare the winner of this month's competition to be the person who gets the furthest through the natural number sequence with 1 gap, with 2 gaps, with etc, etc. Set up your solution as an executable function, or as an executable diamondised character vector, `⎕`*PACK* it with a variable containing your name and address, and `⎕`*APPEND* this package to file `999` *CONTEST* no later than November 30th, 1980. A prize of $50 cash (Canadian) will be awarded to the best non-IPSA entry, while the best entry from I. P. Sharp Associates will receive a book prize of the author's choice.

QUEUE MANAGEMENT USING SHARED VARIABLES

David Bonyun, Ottawa

The design of the shared variable system was based upon the underlying assumption that shared variables were essentially communications devices rather than storage devices. The problem of asynchronous queue management was not considered as important as was flexibility in communication.

When two workspaces share one or more variables, information may be passed between them in a number of different ways. To suggest just a few of the possibilities, there may be:

(a) Full duplex "blinking", where each workspace, in turn, reads a value set by the other, and then sets one itself for return transmission (which achieves great flexibility in communication);

(b) Simplex, single value, where one workspace periodically defines (i.e., sets) a variable and the other workspace reads (i.e., uses) it in between "sets";

(c) Queuing, where one workspace adds items to the end of a queue, while the other reads items from the head of the queue and destroys the item as it is read.

There are two significant differences to be observed when queuing is compared to blinking and single value sharing. The first is that no mention is made of timing: both (a) and (b) require action by one workspace, then by the other, then the first again, and so on. In queuing, the adding to and servicing of the queue are actions which happen in their own time with little reference to the other. The second significant difference is that the words "set" and "use", as found in the **SHARP APL Reference Manual**'s chapter on shared variables, are no longer synonymous with "define" and "read". In fact, when appending to a queue, an existing variable is replaced by a slighly modified version, and this cannot take place without both a "use" and a "set". The servicing workspace must then also both use and set the queue without the top item. It is necessary to ensure that the act of removing the top item does not occur at precisely the same time as a new item is being appended to the queue.

A number of different solutions have been proposed to the problem of queue management in the interface between concurrent tasks. The one which is documented here is that of Roger Moore, I.P. Sharp's Vice President and the chief architect of the communications network. It neatly separates the queue from the shared variable managing the first in the workspace that accumulates it.

A variety of degrees of control for many types of use is available within the SHARP APL shared variable system. In particular, interlocking may be achieved by either workspace which may inhibit (until after a **single** intervening action) either the use or set of a shared variable by itself or by its partner. The solution presented here employs the idea that the shared variable to be used is a single direction channel. One workspace typically collects the queue and "sets" the shared variable; the second (server) workspace services that portion of the queue it receives in the shared variable, and then looks for more.

The first workspace, besides collecting and managing its queue and doing whatever other chores it must, senses the "use" of the shared variable with the serving workspace. When this use is determined, it resets the shared variable with the existing queue (or with a leading subset if it is too long). The serving workspace then may receive one or many queued items, and it establishes its own queue for processing. The maximum permissible length of a queue in the first workspace must be decided for each case.

Sample Code

Assumptions:

- the first workspace has many jobs to do and has a number of shared variables, any of which might be demanding attention
- the queue in each workspace is called *Q* and is a matrix, with each row an item

- the variable *MAXQ* contains the maximum subqueue length
- the serving workspace processes each item individually, and (possibly) reports the results of its service to the first workspace by using its own, single-item, one-way shared variable (seen below as *OUT*)
- the routine *DOSERVER* in the first workspace is performed when the server has used the shared variable *SV*

The first workspace, which collects and manages the queue, has code of two sorts:

(a) Executed when a new item is ready to be serviced

```
     .....
     →OK IF ~ 0∈ρQ
     →OK IF ∨/0 0 1 1 ≠ □SVS 'SV'
     SV←(1,ρNEWITEM)ρNEWITEM ◇ →ON
    OK: Q←Q FIT NEWITEM
    ON: ...
```

(b) Executed when the signal is received that the second workspace has read the shared variable.

```
DOSERVER: →NEXTJOB IF 0∈ρQ
SV←Q[⍳N←(1↑ρQ)⌊MAXQ;]
Q←CLEAR (N,0)↓Q
NEXTJOB: ...
```

Utility functions *IF*, *FIT* and *CLEAR*:

```
     ∇R←A IF B
[1]    R←BρA
     ∇
```

```
     ∇R←A FIT B
[1]    →L IF 2=ρρA ◇ A←(¯2↑1,1,ρA)ρA
[2]   L: →LL IF 2=ρρB ◇ B←(¯2↑1,1,ρB)ρB
[3]   LL: R←(1↓ρA)⌈1↓ρB
[4]    R←(((1↑ρA),R)↑A),[1]((1↑ρB),R)↑B
     ∇
```

```
     ∇R←CLEAR A
[1]    ⍝ removes blank columns from a shrunken character matrix
[2]   →L IF 2=ρρA ◇ R←A ◇ 'CLEAR ERROR' ◇ →0
[3]   L: R←∧⌿A=' ' ◇ R←(0,1-(⌽R)⍳0)↓A
     ∇
```

The second, server, workspace must accept a partial queue and process it; it is assumed below that at the end of each processing there is a "report" sent back via the shared variable *OUT*.

```
     LL: Q←SV ◇ I←1
     L: ... Q[I;] ...
      ...
      OUT← ...
      →L IF (1↑ρQ)≥I←I+1 ◇ →LL
```

Note that both shared variables ought to be interlocked. Full interlocking is obtained by inserting the following code:

```
1 □SVC 'SV'
1 □SVC 'OUT'
```

Various European PTT's have become upset about the ability of the APL system to send a message from one terminal to another directly. In deference to their wishes, the system commands)MSG and)MSGN will be withdrawn on January 1st, 1981.

CORRECTION!
Re: Technical Supplement 28 - Exponential Smoothing
3 = 4 matrix should, of course, read 3x4 matrix, etc. Please accept our apologies.